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# Paper 18

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# Detection of Healthcare Fraud in The National Health Insurance Program Based on Cost Control

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**Abstract**— Fraud in healthcare services has the potential to reduce the quality of health services, harming patients, and state finances. However, the implementation of fraud prevention in healthcare services has not been fully carried out. The purpose of this study is to determine the cost control-based fraud detection algorithm and detect potential healthcare services fraud in hospitals. The study was conducted at 4 hospitals in East Java - Indonesia. Data retrieval is done by the method of documentation and interviews. With interactive analysis generated, 10 cost control-based algorithms that can be used to detect fraud potential in the hospitals. Based on the time series linear regression analysis, the results show that the data groups that can show the fraud potential in the sample hospitals are (i) outpatient cases with special procedures; (ii) inpatient cases with special drugs; (iii) outpatient cases with special drugs; and (iv) inpatient cases with special prosthesis. Data groups that have not been proven to have the fraud potential are (i) a comparison of the number of JKN inpatients with the number of bills of INA-CBGs inpatients; (ii) comparison of the number of JKN outpatients with the number of bills of outpatient INA-CBGs; (iii) disease severity level; (iv) Inpatient cases bills to BPJS Health; (v) Outpatient case bills to BPJS Health; and (vi) inpatient cases with special procedures.

**Keywords**— *Fraud; Healthcare; Hospital, Cost Control*

## I. INTRODUCTION

With the increase in the number of participants enrolled in the health insurance program, it will have an impact on increasing the volume of money that is very large in the healthcare industry and will lead to an increased risk of fraud activities [1]. In the United States, the Federal Bureau of Investigation (FBI) estimates that fraud in healthcare services reaches 3–10% of all bills [2]. In Indonesia, The Corruption Eradication Commission (KPK) notes that based on the BPJS Health report, up to June 2015, with only minimal supervision, 175,774 Advanced Referral Health Facility (FKRTL) have

been detected with a value of Rp. 440 billion suspected fraud [3].

Fraud in healthcare services aims to obtain unauthorized benefits from deliberate fraud [5]. Unlike mistakes and harassment, fraudulent behavior is usually defined as a crime in law. However, there is no global consensus on the definition of fraud and abuse in healthcare services or health insurance arrangements [4].

Fraud in healthcare services can be grouped into 3 (three), namely fraud by healthcare service providers (provider fraud), patients (consumer fraud) and insurance (insurer fraud). While the party that most commits fraud is the health service provider. Based on a literature study on fraud-themed papers in healthcare, it was found that there were 69% of papers that concluded that the healthcare service provider was the party that did a lot of fraud, while 31% of the paper stated that insurance customers committed fraud [5].

To anticipate the spread of fraud in the health sector, the Government of Indonesia through the Ministry of Health issued Minister of Health Regulation No. 36 of 2015 concerning Prevention of Fraud in the Implementation of the Health Insurance Program in the National Social Security System. The development of service-oriented quality control and cost control is done through the use of evidence-based information technology and the establishment of a fraud prevention team of National Health Insurance (JKN) at the Advanced Referral Health Facility (FKRTL). The Fraud Prevention Team is tasked with detecting potential fraud through analysis of claim data. However, according to research [6] currently, the detection of potential fraud is done manually by comparing a suspected fraud with the regulations of the Ministry of Health and the Head of Health BPJS.

Payment for health services in Indonesia in the JKN program uses the INA-CBGs (Indonesia Case Base Groups) system, which is the average cost spent by a diagnosis group.

Most hospitals consider that INA-CBG rates are still far below hospital normal rates. The hospital considers that the INA-CBGs payment system is burdensome to the hospital. The payment system for the INA-CBG model has not satisfied some hospitals in Indonesia. This condition has the potential to decrease the quality of healthcare services for JKN program patients because the INA-CBG rates are not enough to cover the costs of healthcare services. In addition to the low INA-CBG tariffs that have an impact on low service quality, and also the emergence of cost control issue [7].

Cost control is done by developing claim management. Included in cost control is fraud prevention in filing claims [8]. Meanwhile, the gap between the hospital's real tariff and INA-CBG tariffs is driving the potential for fraud [9]. Acts of fraud will undermine important resources in the health care system and threaten health insurance programs [2]. If fraud is not effectively controlled, then the cost of national health services will increase [10]. The purpose of this study is to determine the fraud detection algorithm based on cost control and detect potential healthcare service fraud in hospitals.

## II. TYPES OF HEALTHCARE SERVICES FRAUD

Based on the results of the study [11] using the structured literature review method, it was found that there were 18 forms of potential health service fraud. The eighteen forms of potential fraud found include: 1) Kickback, such as a doctor writing a prescription for a particular drug brand; 2) Self-referral, such as referring patients to clinics, hospitals, laboratories (diagnostic services), doctors will get a commission; 3) Doctor shopping, such as patients who pretend to be sick to get certain drugs; 4) Identity fraud, such as using someone else's insurance card to get health services; 5) Fraud by pharmaceutical companies, such as the sale of drugs that do not pass the drug and food control agency; 6) Device and service price manipulation, such as providing prices to certain users, outside the normal price; 7) Improper coding and upcoding, such as billing for more expensive procedures or services; 8) Unbundling, such as making separate claims on services that are supposed to be a package; 9) Submitting double bills, such as sending the same bill more than once; 10) Billing for services not provided, such as making a claim even though the service does not exist; 11) Providing unnecessary care and maximizing care, such as conducting checks or health services that are not as indicated; 12) False negation cases, such as health service providers making fake negotiations so that the government enters a health service program; 13) Using the wrong diagnosis, such as using a wrong diagnosis to get a certain drug; 14) Billing for services rendered by unqualified personnel, such as health service providers employing health workers who do not have a license / credentials; 15) Lying about eligibility, such as patients lying to doctors or health care providers about the information on insurance benefits they get; 16) Reverse false claim cases, a state of health service providers not returning money that has been submitted a false claim; 17) Managed care fraud, such as transferring risk from the main payer to an intermediary insurance company, payments using capitalization rates for the

population they insure; 18) Waiving co-payments, such as removing incentives and violating participant agreements with insurance companies. Eleven forms of potential fraud mentioned above were also found in Indonesia [12].

Prevention of health service fraud in Indonesia has been regulated in Minister of Health Regulation No. 36 of 2015 concerning the Prevention of Fraud in the Implementation of the Health Insurance Program in the National Social Security System. The Minister of Health's regulation explains the definition of fraud in health services, forms of fraud and fraud prevention systems in hospitals and health centers. There are 19 forms of health service fraud according to the regulation of the Minister of Health including 1) Writing excessive diagnosis codes/upcoding; 2) Plagiarism of claims from other patients (cloning); 3) False claims/phantom billing; 4) Inflating drug and medical bills / inflated bills; 5) Solving episodes of unbundling or fragmentation services; 6) Pseudo referrals / self-referrals, 7) Repeated bills / repeat billing; 8) Prolonged length of stay; 9) Manipulate treatment class / type of room charge; 10) Canceling the actions that must be done/canceled services; 11) Carry out unnecessary actions / no medical value; 12) Deviations from service standards/standards of care; 13) Carry out unnecessary treatment actions; 14) Increase the length of time the ventilator is used; 15) Do not do a visit that should / phantom visit; 16) Do not perform the procedures that should / phantom procedures; 17) Repeated admission/readmission; 18) Conduct patient referrals that are not in accordance with the objectives to obtain certain benefits; 19) Requesting cost sharing is not in accordance with statutory provisions, and Requesting cost sharing is not in accordance with statutory provisions.

## III. RESEARCH METHODS

The population in this study were all Regional General Hospitals (RSUD), Regencies or Cities in East Java Province - Indonesia. Hospital sampling was determined based on a purposive technique by considering four cultural regions in East Java Province, namely Mataraman Culture, Arek Culture, Pandalungan Culture, and Madura Culture [13].

Thus the sample hospitals in the study were RSUD Ibnu Sina, Gresik Regency (representing Arek cultural area), RSUD Dr. Slamet Martodirdjo of Pamekasan Regency (representing Madura cultural area), RSUD Ngudi Waluyo Wlingi, Blitar Regency (representing Mataraman Cultural area), and RSUD Dr. Koesnadi Bondowoso Regency (representing the Pandalungan Cultural area).

Data collection techniques in research using documentation and interviews. To detect the potential for fraud in hospitals, researchers used documentation techniques in the form of BPJS claim data every month in 2018. The BPJS claim data used included the number of monthly inpatients, the number of outpatients per month, the number of monthly inpatient bills, the number of monthly outpatient bills, disease severity level, number of cases with special procedures each month, number of cases with special drug every month, and number of cases with special prosthesis each month.



Based on hospital confidentiality principles, not all hospitals provide the data requested by researchers. Only 1 (one) RSUD provides 2018 claim data requested by researchers. By mutual agreement between the RSUD and the researcher, the researcher must maintain the confidentiality of the data and not include the name of the RSUD in the research publication. The interview technique was conducted with informants from RSUD officials who were in charge of medical services, guarantees, information technology department and anti-fraud team, to explore information related to national health insurance program health service policies and problems faced in detecting fraud in hospitals. The main analysis technique in this study uses a **time series linear regression analysis technique to detect the potential for fraud in the JKN health services program in hospitals.**

#### IV. RESULTS AND DISCUSSION

Based on an interactive analysis the results show that the potential for fraud-related to costs can be known from the following data: comparison of JKN inpatients with the number of INA-CBGs inpatient claims; Comparison of the number of JKN outpatients with the number of INA-CBG outpatient claims; Case severity; the amount of Inpatient bills billed to BPJS Health; the amount of outpatient bills billed to BPJS Health; number of inpatient cases with special procedures each month; the number of outpatient cases with special procedures each month; the number of inpatient cases with special drugs each month; the number of outpatient cases with special drugs every month; and the number of inpatient cases with special prosthesis each month.

##### A. Comparison of the number of JKN Inpatients with the number of INA-CBGs inpatient claims

By observing the trend of data on the number of JKN inpatients and the number of INA-CBG inpatient claims, it can be seen that the potential of hospitals to benefit in a way that is not fair. The algorithm used to see the potential for fraud is that if the trend of the line of data on the number of JKN inpatients tends to be flat or down, but the number of INA-CBGs claims for inpatients tends to rise, then it can be stated there is a potential for fraud. Based on time series linear regression analysis on the data the number of inpatient JKN patients and the number of inpatient INA-CBGs claims have the same trend, ie both the trends are decreasing. This means that based on the comparison of the number of JKN patients hospitalized with the number of INA-CBGs inpatient claims, it can be seen that there is no potential for fraud.

##### B. Comparison of the Number of JKN Outpatients with the number of INA-CBG outpatient claims

By observing trends in the data on the number of JKN outpatients and the number of INA-CBG outpatient claims, it can be seen that the potential of hospitals to benefit is not fair. The algorithm used to see the potential for fraud is that if the trend of the line of data on the number of JKN outpatients

tends to be flat or go down but the number of INA-CBGs outpatient claims tends to rise, then it can be stated there is a potential for fraud. Based on time series linear regression analysis on the data the number of JKN outpatients and the number of INA-CBG outpatient claims have the same trend, ie the trend is equally declining. This means that based on the comparison of the number of JKN outpatients with the number of INA-CBG outpatient claims, it can be seen that there is no potential for fraud.

##### C. Severity Level of Disease

By looking at the trend of the line from the case severity data, it can be seen the potential of the hospital trying to make a profit by manipulating the severity of a disease. If the trend of level 3 data severity tends to increase among others, it can be said that there is potential for fraud. Based on time series regression analysis on level 1, 2 and 3 severity data, the percentage of severity level 1 case is higher than severity level 2 and 3, although the trend of percentage of severity level 1 case data has decreased slightly. By looking at this condition, we can say that there is no potential for fraud related to the severity of the case.

##### D. Inpatient Bill for BPJS Health

The potential for fraud related to the number of inpatient bills to BPJS Health can be analyzed from the trend in the data line of the number of inpatient bills billed to BPJS Health. If the trend of data on the number of inpatient bills billed to BPJS Health tends to increase more than the average data available, then it can be said that there is potential for fraud. The results of the linear regression analysis showed the trend of inpatient bills to BPJS Health during the period 2018 decreased. Even starting in July 2018 hospital inpatient bills to BPJS Health decreased and smaller than the average of existing data. Thus, during 2018 there was no potential for fraud related to the number of inpatient bills to BPJS Health.

##### E. Outpatient Bill for BPJS Health

The potential for fraud related to the number of outpatient bills to BPJS Health can be analyzed from the line trend from the data on the number of outpatient bills billed to BPJS Health. If the trend of data on the number of outpatient bills billed to BPJS Health tends to increase and exceed the average of existing data, then it can be said that there is potential for fraud. Based on time series regression analysis shows that the trend of outpatient bills to BPJS Health during the period 2018 has decreased. Even starting in July 2018 hospital outpatient bills to BPJS Health decreased and smaller than the average of existing data. Thus, during the 2018 period, there was no potential for fraud related to the number of outpatient bills to BPJS Health.

#### F. Inpatient Case with Special Procedure

Analysis of potential fraud in inpatient case with special procedures can be seen by observing the trend of the line of data on the number of inpatient cases with special procedures. If the trend line from data on the number of inpatient cases with special procedures tends to increase and exceed the average of available data, it can be indicated that there is potential for fraudulent health services. There are allegations that the hospital is trying to make a profit in an unnatural way.

Based on time series linear regression analysis, the results show that the trend in the number of hospitalized cases with special procedures during the 2018 period has decreased. Even starting in July 2018 the number of inpatient cases with special procedures has decreased and is smaller than the average of existing data. Thus, during 2018 there was no potential for fraud in the number of inpatient cases with special procedures.

#### G. Outpatient Case with Special Procedure

Analysis of potential fraud in outpatient cases with special procedures can be seen by observing the trend of the line of data on the number of outpatient cases with special procedures. If the trend line from data on the number of outpatient cases with special procedures tends to increase and exceed the average of available data, it can be indicated that there is potential for fraudulent health services.

Based on time series linear regression analysis, shows that the trend in the number of outpatient cases with special procedures during the 2018 period has increased and cut the average line of data. Starting in July 2018 the number of outpatient cases with special procedures has increased and is higher than the average available data. Thus during the 2018 period in the hospital it was found that there was potential for fraud related to the number of outpatient cases with special procedures. There are allegations that the hospital is trying to make a profit in an unnatural way. The recommended follow-up from this condition is that the hospital's Fraud Prevention Team investigates outpatient cases with special procedures, ie in the months where the number of outpatient cases with special procedures exceeds the average available data.

#### H. Inpatient cases with Special Drug

Analysis of the potential for fraud in inpatient cases with special drugs can be seen by observing the trend of the line of data on the number of inpatient cases with special drugs. If the trend line from data on the number of inpatient cases with special drugs tends to increase and exceed the average of available data, it can be indicated that there is potential for fraudulent health services.

Based on the linear time series regression analysis shows that the trend in the number of hospitalized cases with special drugs during the 2018 period has increased. The trend line in the number of inpatient cases with special drugs cuts the average line of data available in July 2018. Thus during the 2018 period in hospitals there is indicated potential fraud related to the number of inpatient cases with special drugs.

There are allegations that the hospital is trying to make a profit in an unnatural way. The follow-up recommendations from the findings of this potential fraud are the fraud prevention team to conduct an investigation of inpatient cases with special drugs starting in July 2018.

#### I. Outpatient Cases with Special Drug

The potential for fraud in outpatient cases with special drugs can be analyzed by observing the trend of the line of data on the number of outpatient cases with special drugs. If the trend line from the data on the number of outpatient cases with special drugs tends to increase and exceeds the average available data, it can be indicated that there is potential for fraudulent health services.

Based on time series linear regression analysis, shows that the trend in the number of outpatient cases with special drugs during the 2018 period has increased. The trend line in the number of outpatient cases with special drugs cuts the average line of data available in July 2018. Thus, during the 2018 period in the hospital there is a potential for fraud related to the number of outpatient cases with special drugs. There are allegations that the hospital is trying to make a profit in an unnatural way. The recommended follow-up from the findings of this potential fraud is the fraud prevention team to investigate outpatient cases with special drugs starting in September 2018.

#### J. Inpatient cases with special prosthesis

Analysis of the potential for fraud in inpatient cases with special prosthesis can be seen by observing the trend in the data line of the number of inpatient cases with special prosthesis. If the trend line from data on the number of inpatient cases with special prosthesis tends to increase and exceed the average of available data, it can be indicated that there is potential for fraud in health services.

Time series regression analysis shows that the trend in the number of inpatient cases with special prosthesis during the 2018 period has increased. The trend line of the number of inpatient cases with special prosthesis cuts the average line of data available in June 2018. Thus during the 2018 period in the hospital it is indicated that there is potential fraud related to the number of inpatient cases with special prosthesis. There are allegations that the hospital is trying to make a profit in an unnatural way. The recommended follow-up from the findings of this potential fraud is the fraud prevention team to investigate cases of inpatient with special prosthesis starting in August 2018.

### V. CONCLUSION

The results of this study found a health service fraud detection system based on cost control. There are 10 (ten) cost-based fraud detection algorithms that can be used to detect potential fraud in hospitals. The results of linear time series regression analysis on hospital claims data related to costs, can be found that there are four algorithms that indicate fraud. Data groups that can indicate potential fraud are (i)



outpatient cases with special procedures; (ii) inpatient cases with special drugs; (iii) outpatient cases with special drugs; and (iv) inpatient cases with special prosthesis. Data groups that have not been proven to have the potential for fraud are (i) a comparison of the number of JKN inpatients with the number of INA-CBGs inpatient bills; (ii) comparison of the number of JKN outpatients with the number of INA-CBG outpatient bills; (iii) disease severity; (iv) Claims from inpatient cases to BPJS Health; (v) Outpatient case bills to BPJS Health; and (vi) inpatient cases with special procedures.

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REFERENCES

- [1] R. Bauder, T. M. Khoshgoftaar, and N. Seliya, 'A survey on the state of healthcare upcoding fraud analysis and detection', *Heal. Serv. Outcomes Res. Methodol.*, vol. 17, no. 1, pp. 31–55, Mar. 2017.
- [2] L. Morris, 'Combating Fraud In Health Care: An Essential Component Of Any Cost Containment Strategy', *Health Aff.*, vol. 28, no. 5, pp. 1351–1356, Sep. 2009.
- [3] Komisi Pemberantasan Korupsi, 'Pembangunan Alat Diagnostik dan Petunjuk Pelaksanaan Pencegahan Korupsi di FKRTL', 2016. [Online]. Available: <https://www.kpk.go.id/id/publikasi/kajian-dan-penelitian/kajian-dan-penelitian-2/501-pembangunan-alat-diagnostik-dan-petunjuk-pelaksanaan-pencegahan-korupsi-di-fkrtl>.
- [4] H. Joudaki *et al.*, 'Using data mining to detect health care fraud and abuse: a review of literature', *Glob. J. Health Sci.*, vol. 7, no. 1, pp. 194–202, 2015.
- [5] J. Li, K. Y. Huang, J. Jin, and J. Shi, 'A survey on statistical methods for health care fraud detection', *Health Care Manag. Sci.*, vol. 11, no. 3, pp. 275–287, 2008.
- [6] H. Djasri, P. A. Rahma, and E. T. Hasri, 'Korupsi dalam Pelayanan Kesehatan di Era Jaminan Kesehatan Nasional: Kajian Besarnya Potensi dan Sistem Pengendalian Fraud', *Integritas*, vol. 2, no. 1, pp. 113–133, 2016.
- [7] 'Kualitas Pelayanan Kesehatan Dipertanyakan, Tarif INA-CBG Perlu Direvisi', *tribunnews.com*, Jakarta, 10-Apr-2018.
- [8] F. W. Indarto, 'Kendali Biaya Jaminan Kesehatan Nasional', *indonesia.id*, Yogyakarta, 27-Apr-2019.
- [9] A. Mitriza, A. Akbar, and C. Base, 'Analisis Pengendalian Potensi Fraud di Rumah Sakit Umum Daerah Achmad Moechtar Bukittinggi', *J. Kesehat. Andalas*, vol. 8, no. 3, pp. 493–499, 2019.
- [10] J. McGee, L. Sandridge, C. Treadway, K. Vance, and A. Coustasse, 'Strategies for Fighting Medicare Fraud', *Health Care Manag. (Frederick)*, p. 1, Mar. 2018.
- [11] D. Thornton, M. Brinkhuis, C. Amrit, and R. Aly, 'Categorizing and Describing the Types of Fraud in Healthcare', *Procedia Comput. Sci.*, vol. 64, pp. 713–720, 2015.
- [12] E. T. Hasri, 'Bisa Jadi, Potensi-Potensi Fraud Ini Juga Sedang Berkembang Di Indonesia', <http://mutupelayanankesehatan.net>, 2019. [Online]. Available: <http://mutupelayanankesehatan.net/3112-bisa-jadi-potensi-potensi-fraud-ini-juga-sedang-berkembang-di-indonesia>. [Accessed: 09-Sep-2019].
- [13] N. M. Wibowo, 'STRATEGI PENGEMBANGAN PELAYANAN RAWAT INAP PUSKESMAS BERBASIS SERVICE DELIVERY SYSTEM', *EKUITAS (Jurnal Ekon. dan Keuangan)*, vol. 17, no. 3, pp. 337–356, Sep. 2013.

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